



Effective Training Factors for Competency of Demolition Operatives in Malaysia

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ABSTRACT

Recently, technology advancement influenced almost every field of life, brings new tools and techniques to reduce human effort and risk involved. Similar in the case of demolition industry, technology changed the demolition procedures significantly. Most of the countries are opting new techniques for demolition operatives, which ultimately reduce the risk involved the demolishing process. Effective competency based training modules has been adopted by the many countries to develop the demolition operatives skills, so the health and safety measure could be increased and also reduce the environmental impacts of the process. Malaysia has demolition procedure but unfortunately, the standards are not updated as compare to the other countries like UK, Australia etc., this enhances the element of the risk in demolition procedures. Current study has examined the factors that influence the demolition operative competency in Malaysian demolition industry. Results indicated that technical competency, risk management, health and safety and the environmental protection practices are the basic practices need for the demolition operatives.

Keywords: Technology Advancement, Demolition, Competency, Environmental Protection

JEL Classifications: M000

1. INTRODUCTION

Since the dawn of civilization, people have demolished structures to make room for new structures, to rehabilitate existing ones, and to create new edifices with materials taken from existing structures. Today, demolition has become a barometer of economic activity. When demolition occurs, it is usually a sign of coming growth, expansion, or renewal (Diven and Taylor, 2006). In recent years, there has been an increased prevalence of building demolition projects throughout the world (Ghuraiz et al., 2011). However, some risks are involved in the demolition procedures if it doesn't handled efficiently. There is an increasing pressure on the demolition industry to apply standard procedures and insure safety and health measures in order to reduce the risks involved in the procedures. The traditional techniques of demolition bring

problems to the environment, people and economy. Therefore alternative solutions are needed to meet the technical requirements and by applying standard procedures to mitigate the risk involved manage and control this major type of waste in an economically efficient and environmentally safe manner. Technological advancements somehow improved the demolition procedure efficiency and mitigate the risk involved (Kartam et al., 2004); however competency of the demolition operatives is the other demolition effectiveness factor which get little attention especially in the context of developing countries like Malaysia.

The developed countries like UK and Australia are applying advanced and standard techniques and procedures to mitigate the risk and insure health and safety management in order to control the major type of waste in an economically efficient

and environmentally safe manner. These countries are using competency-based training programs to enhance their operative's competency. On the other hand, these countries minimized the risk involved in the demolition operative competency through legislation (Haslam et al., 2003). Unfortunately, the implementation in the developing countries like Malaysia are still unclear. This requires a thorough study of practices that are required for the demolition operatives in the country to meet the international standards. In addition, although the growth of the demolition industry is notable, they mostly have not legislated for the minimization of the risk yet. Current study aims to identify factors affecting the competency of the demolition operatives in Malaysia.

2. UNDERSTANDING OF THE DEMOLITION CONCEPT

Demolition is an activity in which the construction process is reversed; that is, the structure, or parts of the structure, are disassembled and removed. Sometimes it is misleading to use the word demolition to describe the industry today, since some structures are no longer demolished, but carefully dismantled or deconstructed so that more materials can be reused and recycled. The demolition of any type of structure is unique, due to the sheer number of parameters that govern the demolition process. Before selecting any type of demolition technique, the demolition contractor needs to consider a set of criteria and assess their relevance to the demolition work to be undertaken, in order to arrive at the most appropriate demolition technique (Abdullah et al., 2003).

Construction and demolition (C&D) waste refers to waste generated by the following: (1) construction, renovation, repair, and demolition of houses (Huang et al., 2002; Jang and Townsend, 2001); (2) demolition of buildings and other civil engineering structures; (3) environmental disasters, such as earthquakes, hurricanes, tornadoes and flood water (Tansel et al., 1994; Lauritzen, 1998). Demolition waste is often the most important component of the solid waste stream of developed countries representing between 20% and 30% and sometimes more than 50% of the total (Ekanayade and Ofori, 2004).

Building demolition is one of the most common activities in the construction industry. Several demolition techniques are commonly used, including mechanical demolition, deconstruction and hybrid demolition. Although deconstruction has been advocated for its environmentally friendly approaches (Pun et al., 2006). Accordingly, increasing building demolition activities are anticipated which accounts huge amounts of C&D waste indicate that building demolition has become one of the most influential civil activities (Gao et al., 2001).

Building demolition, as the final stage of a building's life cycle, can be traced back into ancient history since the first building was built. Until the 1950s, buildings were mostly dismantled by hand at the end of their lives due to structural or functional obsolescence (Roodman and Lensen, 1995; Gordon Engineering, 1997).

Nowadays, following rapid development of construction technology, a number of demolition techniques are available. Especially, the use of mechanical equipment enables demolition techniques to adopt quicker and safer methods (Abdullah and Anumba, 2002). Generally speaking, three demolition techniques are used in building demolition, namely mechanical demolition, deconstruction and implosion. Among the three, implosion is usually used in demolition of high-rise buildings.

Demolition waste is a major part of industrial waste. In general, demolition waste is heterogeneous and consists to a large extent of building materials but includes even small amounts of hazardous substances. Since the early 1980s the processing of building rubble has become more and more common in most industrialized countries. After appropriate processing the major part of these materials meet the technical properties for reuse. Increasing emphasis is being placed on the environment-related properties due to composition and origin (Tränkler et al., 1996).

Demolition process can be divided into three main phases as illustrated in Figure 1 of the sequential flow of activities involved. Principally, the sequence of demolition is carried out in reverse order to the construction process. According to Building and Construction Authority Singapore (2010), there are three principal phases involved in separating and sorting wastes that can be reuse and recycled with non-recyclable items. The first phase is part of building structures with higher concrete content being demolished (such as concrete parapet walls, etc). Then, to avoid contamination of clean concrete debris of building bearing structure, the second phase is stripping of delirious materials (such as bricks, tiles, etc.). The last one is gradually demolishing the bearing and main structure by dismantling part of structures of similar materials to evade contamination of clean concrete debris and to allow separation of concrete debris from other demolition waste.

3. METHODOLOGY

Study aims to identify the factors that can influence the demolition operative competency in the demolition industry in Malaysia. Study used a quantitative method to investigate the

Figure 1: Activities involved in the execution of demolition operations (Abdullah et al., 2008)

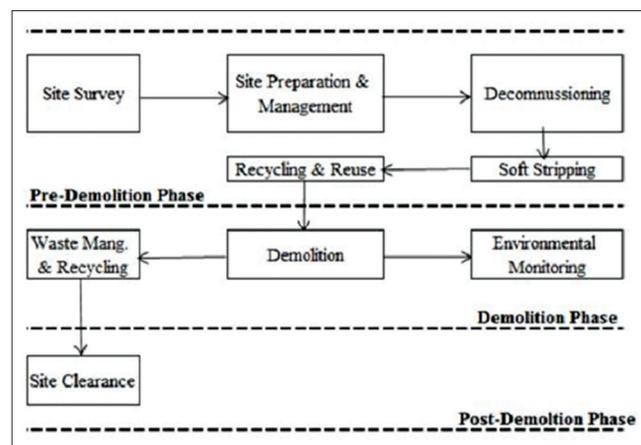


Figure 2: Fish bone diagram for demolition operative competency

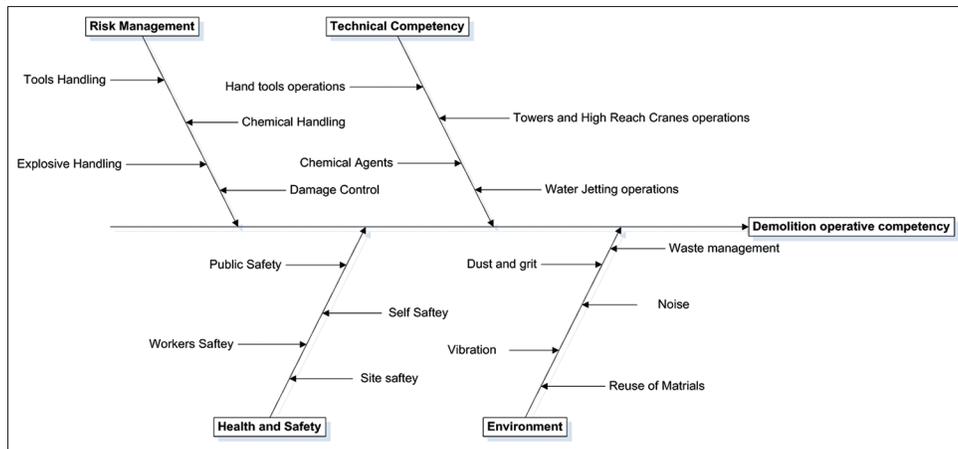
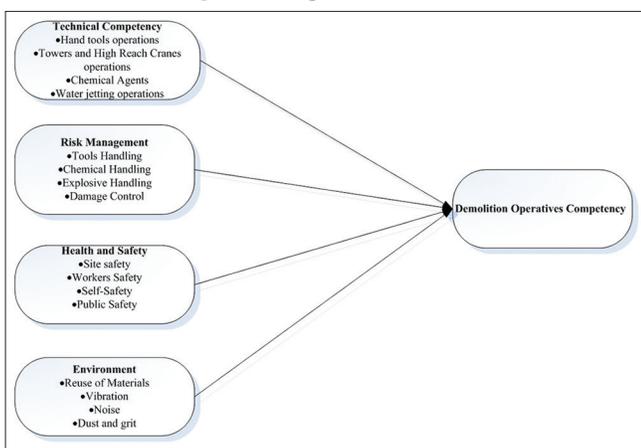


Figure 3: Proposed framework



factors that can affect the demolition operative competency in the Malaysian demolition industry. A questionnaire based on the key factors that can affect demolition operative has been prepared to test the influence of the factors related to the demolition operatives competency. These questions were formulated in compliance with the standard available for the competency requirements for the developed countries. Questionnaire based on a set of 40 question of 5 point likert scale questionnaire, 1 stands for the strong disagreement from the statement and 5 refers to the strongly agree with statement. A purposive sample of 40 contractors based on Malaysian companies was selected for the study.

4. RESULT AND DISCUSSION

Data further analyzed by using Exploratory Factor Analysis (EFA) to find the factors that influence the competency of the demolition operatives. EFA is a widely known statistical technique to identify the set of latent constructs from a set of data. Study aims to identify the factors that influence the competency of the demolition operatives so appropriate statistical procedure was to employ an EFA. EFA has applied using SPSS 21 software. EFA is a technique to test the validity of the data and to figure out the factors related to the data (Hair et al., 2011) and variation explained

Table 1: Exploratory factor analysis

Items	Risk management	Technical competency	Health and safety	Environmental
Q1			0.57	
Q2			0.64	
Q3			0.67	
Q4			0.66	
Q5			0.59	
Q6			0.71	
Q7			0.51	
Q8			0.66	
Q9			0.52	
Q10			0.57	
Q11	0.81			
Q12	0.72			
Q13	0.71			
Q14	0.63			
Q15	0.64			
Q16	0.77			
Q17	0.74			
Q18	0.71			
Q19	0.62			
Q20	0.61			
Q21				0.67
Q22				0.66
Q23				0.64
Q24				0.51
Q25				0.53
Q26				0.55
Q27				0.71
Q28				0.61
Q29				0.83
Q30				0.72
Q31		0.62		0.51
Q32		0.66		
Q33		0.81		
Q34		0.53		
Q35		0.65		
Q36		0.63		
Q37		0.62		
Q38		0.63		
Q39		0.66		
Q40		0.63		

by the factors identified in the data analysis. Item is considered to be significant if the factor loading of the item on latent factor is above then 0.50 (Hair et al., 2010). Table 1 has shown the results

of EFA. Initially the EFA explore the four latent constructs on the basis of the co-variation produced by the each factor.

Table 1 shows the factor loading values are above the prescribed threshold. Factor 1 explained the total of 27.8% of variation in latent construct. The factors are related to applications of risk management so the factor named risk management. Factor 2 explained the 23.4% of variation in the latent construct and related to the technical competency questions so name technical competency and the factor 3 explained the total of 18.9% of variation and related to the health and safety issues so named health and safety and last factor explains the 15.1% of variation and named environmental. In total four factors explained the 85% of cumulative variation in the data.

5. CONCLUSIONS

EFA results identified the four basic factors that influence the competency of the demolition operatives in the Malaysian demolition industry. A closer look at the factors and related items given detailed practices required for the demolition operatives. Figure 2 shows the related construct with the practical implementation of the competency. Risk management involves the practices of the tool handling, explosive and chemical handling procedures and damage control practices. Technical competency on the other hand required procedures to use the hand tools, towers and high reach crane operations, chemical and water jetting operations. Health and safety requirements related to the self-safety, workers safety, site safety and public safety procedures and environmental concerns related to the dust control, noise control and other waste management.

Above mentioned practices can lead to a framework for the affective training for the demolition operatives in the Malaysian Industry. Figure 3 proposed a framework for the training and also highlighted the basic required factors in each factor related the competency of the demolition operatives in Malaysia.

Study is useful for the contractors in the Malaysian demolition industry to enhance the effectiveness of the demolition operative's effectiveness. These factors are crucial for the demolition operative's efficiency, so contractors should focus on the training of their operatives to enhance their competency in the areas of risk management practices, technical competency, health and safety practices and environmental concerns. Furthermore, these factors are need to be investigate empirically in the future studies in order to establish a competency based training program to enhance the effectiveness of the demolition operative in the Malaysia.

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